

The Canadian Entomologist.

VOL. XLI.

GUELPH, JANUARY, 1909.

No. 1.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 26.

THE PREPARATION OF BEETLES FOR THE MICROSCOPE.

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Twenty-five years ago the use of the compound microscope in the study of beetles was comparatively uncommon, nearly all collectors being satisfied to do what they could with a hand lens and to take the rest on trust, sending the majority of their smaller captures to some "authority" whose word must necessarily be law. There is now a decided and growing tendency in America to break away from the traditional method of obtaining names, and this feeling is reflected in several letters received from correspondents asking information on matters of technic. The accompanying notes are offered as an outline which may be followed at light expense by any one who has access to a microscope, and while no originality is claimed for the processes, they are presented in this form in hope that they may benefit some student who has not the privilege of studying under professional supervision, and who is without manuals on microscopical methods. While capable of extension and modification in many directions, the plan here outlined suffices for all ordinary study of external structures so far as they concern the present-day classification of Coleoptera. Larvæ may be prepared in the same way.

Such structures as those pertaining to the sclerites of the ventral surface, the main points of sculpture and vestiture, the insertion and general form of the antennæ, and even the shape and armature of the mentum may be made out with comparatively little difficulty in all but the smallest beetles by any one who has a good hand lens and who will take pains to compare these structures as illustrated by a few identified forms with those he desires to investigate. In other words, progress should be from the known to the unknown rather than the taking up of the latter as a distinct proposition. Ordinarily the parts requiring investigation under high power are the legs and antennæ of small species, with the aim of determining accurately the number and proportions of the joints, the extent of ankylosis, and so on; the mouth-parts of even the larger

species ; occasionally the spiracles are of great interest, though but little studied, while the sculpture and markings of the elytra are sometimes beautifully brought out by rendering them transparent and examining by transmitted light. It is well worth the time of any entomologist to study closely under higher powers the mouth-parts and other appendages of even the larger beetles, as he gains in this way a familiarity with the normal appearance of these structures in various groups, and the interpretation of generic and specific characters in more obscure types becomes a matter of less difficulty. If one has dissected a large number of insects and studied them carefully, he is the better qualified for understanding the visible portions of those forms that are too rare to be cut up or whose integuments are so thick and clumsy as to be unavailable for balsam mounts.

For dissection, alcoholic specimens are usually preferable to dry ones, but the latter may be prepared readily by relaxing in the ordinary manner in a softening dish or by soaking for a few minutes in hot water. The principal objection to the use of dried specimens is that such material is more likely to be dusty and to give trouble in getting clean mounts, or else to contain so much air as to make extra work in getting rid of the resultant bubbles.

The tools needed are few. A pair of fine forceps, a slender-pointed scalpel, and a pair of small scissors with sharp, delicate blades are required, and may be obtained from any dealer in microscopical supplies. These may be supplemented by a couple of dissecting needles, made by cutting off the heads of two insect pins and forcing the blunt ends into handles of soft wood, about the size of ordinary penholders. The needles are useful in holding specimens while cutting. A block of clean soft wood, against which to cut when separating the insect members, will be found convenient and will preserve the edge of the scalpel.

The chemicals required are : (1) a small bottle of 15% aqueous solution of caustic potash ; (2) a quantity of commercial alcohol, which runs about 90% ; (3) some absolute alcohol ; (4) clearing fluid, which may be oil of cloves, or, if preferred, a mixture made by adding pure spirits of turpentine to an equal quantity of liquefied crystals of carbolic acid ; (5) some hard (dried) Canada balsam dissolved in enough pure benzole to make a freely-flowing fluid. This should be kept in the special balsam bottle sold for the purpose, and may be thinned with more benzole as it becomes thicker with age. The dishes in which the chemical treatments are

carried on should be of some type that is easily covered, for protection of the contents from dust and evaporation, and for the sake of economy should be small. Those known as watch glasses answer well, but deeper-glass dishes with separate covers are preferable. The potash mixture may be had at any drug store, the absolute alcohol, clearing fluid, and balsam, as well as the dishes, may be purchased from any good supply house for microscopical materials. Slides and cover-glasses for the mounts are to be procured at the same places.

In dissecting beetles, the following sequence has been found convenient, though it may be varied in some cases. As each part is cut off it should be placed at once in a dish of clean water.

1. Take off the legs, being careful not to destroy the coxa if it is desired to include that joint in the mount.
2. Remove the elytra and hind wings if they are wanted, otherwise they may be left on the specimen, unless abdominal dissections are required.

3. If the spiracles are to be examined, take the scissors and separate the lower part of the abdomen from the upper, cutting along just below the sharp lateral edge. As a rule the spiracles are found in the upper portion, the lower may usually be discarded.

4. Cut off the head. Remove the antennæ carefully by digging them out of the cavities in such a way as not to injure the basal joints. Take off the mandibles by forcing each one outward with the point of a heavy pin until it comes loose at the articulation. Now split the head by forcing the tip of the scalpel (which should be long and slender) into the posterior foramen or neck, opening and cutting through one side against the soft wooden block, afterwards turning the instrument over and cutting through the other side. This will separate the top of the head from the lower half. Remove the labrum from the upper half. From the lower the maxillæ may now easily be dissected, since their bases are exposed from above, and the labium may be trimmed loose from the remaining tissues. Frequently the mentum is so thick that it is better to study it with a hand lens and to be content with detaching the ligula and palpi for the microscope.

Throughout the process of dissection care must be taken not to allow the specimen to dry, or it will become brittle and permeated with air bubbles. The parts may safely be left in water for a day or two, or they may be started immediately on the processes leading up to the final mounting, the steps being as follows :

1. Place the specimens (except the hind wings, which should not be treated thus) in a dish containing some of the potash solution. This substance disintegrates the muscular and other body tissues quite rapidly, but affects the chitinous framework on which our classifications are based, but very slowly, though the dissolution of enclosed pigments renders the hard parts more transparent. The objects must remain in the potash until they are sufficiently softened to permit of the muscular debris being removed easily and the chitin rendered fairly clear. In many instances this will require but a few hours, or it may take several days, the length of time depending on the thickness, solidity and pigmentation of the dissection. The true way of judging is through experience, which is soon gained. Ordinarily considerable latitude may be allowed the time of immersion, a few hours more or less making little difference in the majority of cases. The mouth-parts of most beetles should be soaked at least twenty-four hours, the legs somewhat longer, while the mandibles and elytra are still more refractory. If it is desired to hasten the process the solution may be kept warm, but on the whole it is preferable to carry on all operations at the natural temperature of the room.

2. Take the specimens out of the potash and lay them in a dish of clean soft water. By pressure with the finger-tip carefully squeeze out the fluid remains of the internal organs, muscles, and so on, being particular to direct the discharge through a natural opening or through one of the orifices where the member was amputated. Place for a short time in another dish of clean water to get rid of most of the remaining potash.

3. Change the dissections to a dish of commercial alcohol. The hind wings may now be added and carried through the rest of the stages along with the other pieces. Leave in the alcohol for at least several minutes, or until some convenient time when the next change may be made.

4. Remove to absolute alcohol. This is for the sake of getting rid of all traces of water, since future successes depend largely upon thorough dehydration. Give the specimens plenty of time, several hours if convenient, since no damage arises from prolonged immersion.

5. Transfer the parts to clearing fluid. Let them remain in this for several hours, since in thick specimens the process of permeation is slow. Thin structures will clear in a few minutes, but if the work is hurried the balsam is likely to be clouded when the object is mounted.

6. Take one of the glass slips upon which the final mount is to be made, and, after carefully cleaning it, place in the middle a large drop of

balsam. With fine forceps lift the dissections from the clearing fluid and arrange them in the drop in approximately the order you wish to preserve. If necessary apply a little more balsam, then put on a clean cover-glass, pressing it lightly into place. Should too little balsam have been used more may be run in under the edge of the cover by capillary attraction, while any surplus should be left on the slide until dry. Care should be taken to select parts of about the same thickness for each mount, since thick objects like mandibles sometimes hold the cover so far off from smaller parts that these latter will twist and turn before the balsam hardens enough to hold them in place. If it is desired to support the cover in any place, to keep it from rocking out of level, small pieces of glass may be employed, since they are not conspicuous among the dissections. Any disarrangement of the objects may be corrected by inserting a very fine pin under the cover-glass and moving them into the required positions. When everything is satisfactorily placed, set the slide away in some safe spot, where it will lie flat until the balsam hardens. This hardening may be hastened by gentle heat, such as is afforded by a radiator, but the balsam is likely to become discoloured if allowed to get too warm. The process of hardening may not be completed before several weeks, but when it is satisfactorily finished the surplus may be scraped off with a sharp knife and the slide carefully washed with alcohol applied on a rag. If this leaves a misty scum, breathe on the glass and polish with a soft cloth, taking care not to tear off the cover-glass and the mount. In final storage the slides should always lie flat, never set them on edge. The manner of labelling may be left to personal taste, but a convenient method is to paste a square of gummed paper on one end of the slide, writing thereon the necessary data.

DR. WILLIAM MORTON WHEELER, who, during the past summer, accepted the professorship of Economic Entomology in Harvard University, has recently been appointed honorary Curator of social insects in the American Museum of Natural History, where, until the present year, he had been Curator of the Department of Invertebrate Zoology since 1902. At the close of his term of service at the Museum, he presented to the institution his entire collection of Formicidæ—the result of many years of earnest effort and study—a gift of such value as to make the Museum the possessor of the finest collection of its kind in America, and one of the three largest in the world.—*Science*.

EVERES COMYNTAS—AMYNTULA.

In working out the *Everes argiades* group with Dr. Chapman and Mr. Tutt certain definite specific conclusions have been arrived at. *Coretas* is distinct from *argiades*, and *decolorata* has been shown to be a colour form of the former ; this Mr. Tutt proves conclusively is the case in the October and November numbers of the Entomologists' Record, recently issued. In dealing with the Indian species Dr. Chapman and I have found that species considered by De Nicéville to be *argiades* resolve themselves into at least three species, if not four. Whilst in China and Japan we have the meeting place of both the European species and the Indian species almost in a state of flux. *Argiades* and a variety certainly occur there ; *parrhasias* occurs in Japan, *dipora* apparently occurs in China, though we require a little more material to settle the question, and without going into the species occurring in the Malay Region and Australia, which are now well known, we are left in a state of some uncertainty with those obtaining in the Nearctic Region. *Comyntas* is a very close ally of *argiades* ; in fact, from the genitalia, we should hardly be justified in separating them ; *amyntula* appears to be a form going along the lines that *coretas* has gone over, but as yet not having gone so far, perhaps, but in England we suffer from a lack of material to enable us to investigate the matter. This, therefore, is the object of my note. Will Canadian entomologists help us ? Will any American entomologists who may read these words also help us ? If so, we shall be most grateful. I shall be glad to purchase (or to make a return by way of exchange) as much material from different localities as I can get. I am desirous of obtaining all the forms allied to *comyntas*, and I should like to have specimens from East and West, from North and South, from the Central States ; in fact, from as many localities as possible. I should then be able to deal with the whole group in, I hope, a satisfactory manner, and I trust by the correspondence that may possibly ensue with our fellow-observers across the water that some new and perchance unrecorded facts concerning the life-histories of the species may be brought to light.—GEORGE I. BETHUNE-BAKER, 19 Clarendon Road, Edgbaston, Birmingham, England.

WE REGRET to learn from *Science* (Dec. 11, 1908) that "MR. A. H. KIRKLAND, Superintendent of the Massachusetts State work against the Gypsy and Brown-tail moths, has resigned his office."

LEPIDOPTEROUS GALLS COLLECTED IN THE VICINITY
OF TORONTO.

BY DR. WM. BRODIE, TORONTO.

Gnorimoserema (Gelechia) Gallaesolidaginis, Riley.

(The Low Solidago Gall.)

Galls usually on the lower third of the stems of *S. Canadensis*, occasionally on the upper third, rarely at the summit of the stem. The galls vary in form from spindle form to prolate and oblate spheroid; and in size from 10×21 mm. to 18×30 mm.

When young the producer larvae are confined in small cells, but when mature the cells are large, retaining the form of the exterior of the gall, the larvae moving freely about feeding on the interior surface.

Some observers say the interior of the gall is lined with silk. I have never found this, but preparatory to the exit, the mature larva before pupating constructs a silken hammock in the upper end of the gall, at right angles to the axis of the gall, and opposite the aperture of exit. The larva resting in this hammock bites out a hole to the epidermis of the gall, which is carefully left. This hole is bevelled towards the outside, and then neatly filled up with the material gnawed out, mixed with a silk-like substance, doubtless from a gland, which forms a tight-fitting, hard plug which cannot be pushed in from the outside, but is easily pushed out from the inside.

The mature pupa places itself on the hammock, and using a part of it as a fulcrum, pushes out the plug, and enters on mature life.

A fair instance of the mental make-up of insects evidences two important attributes of mind, memory and choice.

I have kept up a somewhat continuous acquaintance with this common Solidago gall, its producer, and parasites since the summer of 1856. I have found it in Essex, London, Owen Sound, Bruce Peninsula, Manitoulin, St. Catharines, Napanee, Temagami and Algonquin Park. It is common in Muskoka, we may say common throughout Ontario.

Although most common on *S. Canadensis*, it is occasionally found on *S. nemoralis* and *S. serotina*.

From Manitoba, Saskatchewan and Alberta I had galls sent to me collected from some species of Solidago, which in structure were similar to Toronto galls. But as I failed in rearing producers, identity was uncertain, although the parasites were the same as Toronto species.

Records of annual collections of galls, from 1876 to 1896, showed the time of emergence of the producers to be from about Aug. 20 to Sept. 1, in each year.

January, 1909

In a collection of over 100 galls, made about 12 miles east of the city, from Sept. 1 to Sept. 15, 1886, all the producers had emerged. About 50% of the galls were parasitized, principally by *G. gelechiae*. These, from 12 to 20 pairs from each infested gall, emerged during the last week of September and the first week of October, 1886. I find they always leave the gall before winter.

The *Pimplas* began to emerge April 17, 1887. Seven pupæ of an *Ichneumonoid* were put in a separate jar, the imagoes began to emerge June 1, 1887, but from one pupa there emerged an *Ormyrus*, proving this *Ormyrus* to be a secondary.

From a collection of galls made at Grimsby in May, 1892, the growth of 1891, *Pimplas* emerged from June 1 to June 13, 1892. At this last date galls of the year were fully grown.

The moths pass the winter in some secure dry place, such as under the bark of dead trees. I have kept specimens over winter several times in my cellar, the following season they pair and oviposit on *Solidago* plants when they are less than half-grown.

The most common primary parasites are the "Inflating Chalcid," of Riley; *Copidosomagelechio*, of Howard, which emerges the same season, usually in September; it is not likely they find another host of the season, but hibernate in the imago form. The inflated skin of the producer larva is like a sack full of the larvæ and semipupæ of the parasite.

Two common parasites are *Pimpla inquisitor* and *Pimpla pteralis*, the last not quite as common; and that ubiquitous scourge of leaf-eating insects, *Cryptus extrematis*, not rare. These, with an *Ichneumonid*, not yet identified, are the primary parasites I have had from this gall.

The only secondary parasite which I have found in this gall-life system is that world-wide regulator of life-relationship in the insect world, *Dibrachys boucheanus*.

I found this secondary in the galls collected near Grimsby and in a lot collected near Prescott. The occurrence of this secondary in the *Solidago* gall may be of much economic importance, for, as *Dibrachys* is a check on the primary parasitism of the codling moth, the co-host relationship may be favourable to the secondary or otherwise.

The agency of parasitism is powerful, and should not be discounted by economic entomologists, and while destroying the injurious, it is wise to utilize the safeguards which nature has provided. It is, unfortunately, true that we know of but few cases in which plant-eating species can be successfully combated while in the imago form.

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF
NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.

PAPER II (SPECIES FROM NEBRASKA).*

The material upon which this paper is based belongs to the University of Nebraska. I wish to thank Mr. H. S. Smith for the loan of the above-mentioned material.

In Paper I, p. 180, read *Lycaota* for *Lycasta*.

Emphytus Gillettei, Roh. (CAN. ENT., June, 1908, p. 178), equals *Emphytus Gillettei*, MacG. (Rept. of State Entomologist of Colorado, 1902). This insect is injurious to strawberries around Denver. It was bred by Mr. S. A. Johnson, of Ft. Collins. Commonly called "The Strawberry Saw-fly."

Dolerus femur-rubrum, n. sp.—♀. Length, 8 mm.; length of anterior wing, 7 mm. Head finely, densely punctured, denser on front, sparser on occiput and cheeks; frontal furrows not extending beyond ocelli; ocelli in an almost equilateral triangle, distance between hind ocelli less than to the nearest eye margin; antennæ rather short, third joint a little longer than fourth; clypeus deeply emarginate, lobes broad; middle lobe of mesonotum finely, densely punctured, lateral lobes more sparsely so, and more shining; scutellum about as lateral lobes, perhaps a little denser; scutellar appendage smooth, shining, middle ridge strong; mesopleura with large punctures; mesopectus shining, finely punctured; claws with a small tooth in about middle; venation normal; abdomen shining; sheath obliquely rounded. Colour black; labrum, tegulae, pallid; clypeus and apical palpi joints piceous; abdominal segments 1-6 ferruginous, venter somewhat brownish; femora rufous (four posterior pairs somewhat brownish), rest of legs dark brown or black; wings hyaline, nervures and stigma black; face and thorax with short white pile.

Habitat.—West Point, Nebr., June, 1888. Type in Nebraska University.

Separated from *D. albifrons*, its nearest ally, by its larger size, the claws with an inner tooth, trochanters and hind tibiae being black. It is also somewhat related to *D. minusculus*, MacG., but the head is without a carina, the lateral lobes of mesonotum are punctured, collar is black, etc.

*Paper I was published in the June number (1908) of the CAN. ENT., Vol. XL, pp. 175-180.

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A ♂ from Sioux Co., Nebr., July, may be the male of this species, but I am not sure. Length, 6 mm.; the lateral lobes of mesonotum are more shining, wings darker, legs below coxae rufous, tarsi infuscated.

Dolerus Piercei, n. sp.—♀. Length, 8 mm.; length of anterior wing, 8 mm. Head rather densely punctured with large punctures, those on the vertex and occiput sparser; frontal furrows not extending beyond ocelli; head behind a line joining superior orbits raised; antennae rather stout, third joint a little longer than fourth; ocelli in a low triangle; distance between hind ocelli much less than the distance from them to nearest eye margin; clypeus deeply emarginate, lobes broad, rounded; middle lobe of mesonotum rather densely punctured, lateral lobes more sparsely punctured; mesopleura punctured as middle lobe of mesonotum; mesopectus shining, with some distinct punctures; scutellum probably more densely punctured than lateral lobes; scutellar appendage longitudinally striated; claws with a middle tooth; venation normal; abdomen shining, smooth; sheath concealed more than usual; cerci robust. Colour rugosuginous; head, antennae, spot on middle lobe of mesonotum, scutellum and appendage, metanotum, not basal plates, mesopectus, lower part of mesopleura, legs, black; wings dusky hyaline, nervures and stigma intense black; head (thorax somewhat) with white pile.

Habitat.—Lincoln, Nebr., April 19-22, "Immodelle" (W. D. Pierce). Type in the University of Nebraska.

Most closely related to *D. bicolor*, Beauv., but may be separated by the different sculpture of scutellar appendage, punctures on lateral lobes of mesonotum sparser, head being raised behind eyes, black on middle lobe of mesonotum, rugous lateral lobes, etc.

Dolerus simulans, n. sp.—♀. Length, 9 mm.; length of anterior wing, 7 mm. Front and lower part of face densely punctured (in some places somewhat striato-punctate); head behind a line from superior orbits somewhat raised, this part is more sparsely punctured and is shining; frontal furrows not extending below ocelli; ocelli in almost an equilateral triangle, the distance between the hind ocelli much less than to the nearest eye margin; antennae rather stout, third joint somewhat longer than fourth; clypeus deeply, angularly emarginate, lobes pointed; mesonotum with large, separated punctures; scutellum with a little larger and denser punctures; scutellar appendage striated; mesopleura irregularly roughened; mesopectus shining, evenly punctured throughout; claws with an inner tooth, in about the middle; venation normal; abdomen shining; sheath broad, pointed at upper apical corner; cerci shorter than sheath, robust;

apex of abdomen with rather long hair. Colour rugo-ferruginous; head, antennæ, scutellum, metathorax (including basal plates, usually), mesopleura and pectus, legs, two apical segments of abdomen and sheath, black; wings smoky-hyaline, nervures and stigma black; head and thorax with white pile.

Habitat.—Three ♀'s, Florissant, Colo., June and July, 1907, on foliage of *Salix brachycarpa*; ♀, Boulder, Colo., May 12, 1907, on foliage of *Salix luteosericea* (S. A. Rohwer); ♀, Dolores, Colo.; ♀, Silverton, Colo., June 20, 1892 (C. P. Gillette); 12 ♀'s, Ute Creek, Costilla Co., Colo., 9,000 ft., June and July, 1907 (H. S. Smith, L. Bruner, R. W. Dawson); ♀, Ft. Garland, Colo., July 12, 1907 (L. Bruner).

In some specimens there is a black spot on anterior lobe of mesonotum. The basal plates are sometimes rufous. The wings vary somewhat in smokiness.

I had confused this with *similis*, Nort., but it is quite distinct, easily separated by these characters: The rufous lateral lobes of mesonotum, entirely black legs, having the mesonotum more closely punctured.

Dolerus Coloradensis, Cress.—I have seen 6 ♂'s from Ute Creek, Costilla Co., Colo., 9,000 ft., July 9 to 23, 1907 (L. Bruner and R. W. Dawson), which I have called the male of *Coloradensis*. It may be briefly described as follows: Length, 9 mm.; structure as in ♀; black; first five abdominal segments rufous; wings rather dark. I have seen ♀'s of this species from the above locality, Larimer Co., Colo., and Halsell, Nebraska, June. The last has the clypeus rufous. Specimens in the Colorado Agricultural College collection, determined by Mr. Harrington as *D. tejonensis*, Nort., are *D. Coloradensis*, Cress., so Mr. Weldon's record of *tejonensis* from Colorado is a mistake (CAN. ENT., Sept. 1, 1907). Scutellum black; sides of mesopleura above rufous; cerci black; scutellum with a good many punctures; claw-tooth blunt; wings not at all yellowish.....*Coloradensis*, Cress. Scutellum rufous; mesopleura black; cerci rufous; scutellum almost without punctures; claw-tooth sharp; wings somewhat yellowish.....*tejonensis*, Nort.

Schizocerus Nortoni, n. sp.—♂. Length, 5½ mm.; length of anterior wing, 5 mm. Robust. Head narrower than thorax, not very strongly transverse; eyes prominent, shining, impunctate; ocelli in a low triangle, distance between the two lateral ocelli about equal to the distance to the nearest eye margin; frontal furrows indistinct; ocellar basin almost

obsolete; middle carina strong; antennæ reaching to about middle of scutellum, third joint bifurcate, clothed with long black ciliæ on under side; clypeus truncate; thorax smooth, shining, but not highly polished; scutellum broadly rounded at apex; first transverse cubitus wanting; third cubital cell wider at the top than at the bottom; stigma regularly rounded on lower margin; lanceolate cell of hind wings longly petiolate; claws simple; posterior femora robust; abdomen as usual. Colour black; mandibles and sides of pronotum piceous; basal plates dull brown; abdomen, except the apical segment and first dorsal segment, ferruginous; four anterior legs below knees pallid; wings dusky-hyaline, nervures and stigma dark brown.

Habitat.—Brady Island, on Platte River, Nebraska. Type in the collection of the University of Nebraska.

This species has its nearest ally in *S. brunniventris*, Cress., but is larger, the tegulae are black, venation is brown, abdomen ferruginous, etc.

Dedicated to the author of the most extensive work on North American Saw-flies.

Schizocerus lineatus, n. sp.—♀. Length, 6 mm.; length of anterior wing, 5 mm. Rather robust. Head narrower than thorax, not strongly narrowly transverse; eyes prominent, shining, polished; frontal furrows well defined, broadest where they curve around the ocellar basin; ocellar basin quite distinct, walls rounded, pointed at lower margin; middle carina high, sharp; antennæ with some black down; clypeus slightly emarginate; ocelli in a low triangle; thorax shining; claws simple; posterior femora rather robust; posterior tibiae about a third longer than their tarsi; first transverse cubital present; third cubital cell wider at the top than the bottom; second recurrent nervure interstitial with second transverse cubitus (in one wing it is received in the second cubital cell); abdomen shining; sheath almost entirely concealed. Colour black; mandibles and ocelli piceous; pronotum, tegulae, lateral lobes of mesonotum, sometimes sides of anterior lobe, line on side of abdomen reddish-yellow; four anterior legs below the knees, base of posterior tibiae yellowish-white; wings hyaline, nervures brown, venation rather weak.

Habitat.—Geneva, Nebraska. Co-types in the collection of University of Nebraska and in the author's collection.

A very distinct species, easily known by its size and the pale yellow-red on the sides of the abdomen. The black of the abdomen varies to pale brown.

Schizocerus collaris, n. sp.—♀. Length, 4 mm.; length of anterior wing, $3\frac{1}{2}$ mm. Head narrower than thorax, not transverse; eyes more spherical than usual, shining, impunctate; ocelli in a low triangle, distance between the two lateral ones about equal to the distance to the nearest eye margin; frontal furrows broad, distinct, coming up as high as lateral ocelli; ocellar basin distinct, walls rounded; middle carina strong; antennæ clothed with short hair; antennal foveæ large, especially in supraclypeal area; clypeus truncate; thorax shining; scutellum obtusely pointed at apex; claws simple; hind tibiæ about a third longer than their tarsi; first transverse cubitus wanting, second recurrent interstitial, or almost so, with second transverse cubitus; stigma broad at base, tapering to apex; lanceolate cell of hind wings wanting; abdomen shining, sheath well concealed. Colour: head black; thorax and abdomen dark brown; mandibles and ocelli piceous; pronotum, tegulae, line on side of abdomen, reddish-yellow; four anterior legs below knees and base of posterior tibiæ pallid; posterior femora, trochanters and coxae almost black, rest of legs brown; wings hyaline, venation brown.

Habitat.—Antonito, Conejos Co., alt. 7,888 ft., Colorado; also Nebraska, "office window," March 24, 1899, and Harlan, Nebr.

A ♀ from Nebraska has the ocellar basin very poorly defined, but otherwise seem to agree.

Most closely related to *S. lineatus*, Roh., but is much smaller, and the lateral lobes of the mesonotum are dark brown, not reddish-yellow.

Hylotoma nigrescens, n. sp.—♂. Length, $5\frac{1}{2}$ mm.; length of anterior wing, $5\frac{1}{2}$ mm. Front and occiput subopaque, finely punctured, entire posterior orbits shining, with a few small punctures; frontal furrows distinct, wide and with sloping walls below ocelli; ocelli in a low triangle; ocellar basin wanting; middle foveæ large, extending almost to lower ocellus, walls sharply defined, broader above than below; on each side of the broad, high middle carina the supraclypeal area is depressed into a fovea; clypeus truncate; third joint of antennæ ciliate beneath; thorax smooth, shining; scutellum obtusely rounded at apex; middle and posterior tibiæ with a side spur; first joint of hind tarsi a little longer than $2+3$; tarsal claws simple; venation normal for members of Section II (Ashm., CAN. ENT., 1898); abdomen shining. Colour black; mandibles at apex piceous; legs beyond femora white; femora dark brown; basal two-thirds of wing dusky, apical third hyaline, iridescent; nervures and stigma brown.

Habitat.—West Point, Nebraska, July 1, 1887, "on plum." Type in collection of the University of Nebraska.

The following table separates all the entirely black or blue-black *Hylotoma* of boreal North America :

Length, 12 mm.....	♂, <i>spiculata</i> , MacG.
Length, under 10 mm.....	1.
1. Colour black ; legs beyond femora pale ; base of wings dark.....	<i>nigrescens</i> , Roh.
Colour blue-black.....	2.
2. Four posterior legs entirely black ; wings violaceous, paler at apex.....	<i>cerulea</i> , Nort.
Four posterior legs not entirely black ; wings smoky-hyaline.....	3.
3. Four anterior tibiae pale ; costa usually yellowish.....	<i>Macleayi</i> , Leach.
Four anterior tibiae black.....	<i>mentzeliae</i> , Ckll.

Hylotoma grandis, n. sp.—♀. Length, 10-12 mm. Robust. Head narrower than thorax, shining, outer orbits and vertex impunctate, front with a few small punctures ; ocelli in a low triangle ; ocellar basin shallow, joining with the elongate middle fovea ; middle fovea with well-defined walls, narrower below ; middle carina broad, strong ; frontal furrows extending as far down as ocelli ; antennal foveæ elongate, broad, extending downward to clypeus ; antennæ subclavate, second joint shorter than first ; clypeus circularly emarginate, densely punctured ; mandibles broad ; thorax shining ; posterior angles of pronotum sharp ; scutellum convex, rounded at apex ; middle and posterior tibiae with lateral spurs ; all the tibial spurs simple, sharp ; tarsal claws simple ; basal nervure joining subcosta basad to origin of cubitus ; stigma widest at base, tapering to apex ; third cubital cell longer on radius than on cubitus ; hind wings normal ; abdomen as usual. Colour cherry-red ; ocelli piceous ; antennæ black ; head, pronotum in the middle, tegulæ, entire mesonotum, mesopectus ; entire metathorax, all the legs, sheath, blue black ; wings very dark, darkest on anterior margin.

♂.—Length, 9 mm. Differs from ♀ in having the antennæ with small hairs, the ocellar basin slightly separated from middle fovea, the basal nervure joining the subcosta at origin of cubitus.

Habitat.—Halsey, Nebr., June, 2 ♂'s, 2 ♀'s. Co-types in the collection of the University of Nebraska and in the author's collection.

This species is closest to *H. humeralis*, Beauv., but the abdomen is without black, second joint of the antennæ is shorter than the first, the

third joint of maxillary palpi is not swollen, etc. In the absence of black from the abdomen and other characters it resembles *H. miniata*, Klug, but the metathorax is blue-black, and all the dark markings of *miniata* are black, while in *grandis* they are blue-black.

Macrophya pulchelliformis, n. sp.—♂. Length, 7 mm.; length of anterior wing, 6½ mm. Head narrower than thorax, densely punctured with rather large punctures; ocelli in almost an equilateral triangle, distance between the lateral ocelli much less than the distance to the nearest eye margin; third antennal joint a little longer than fourth; eyes distinctly converging, distance between them at the clypeus a little more than the length of the third antennal joint; clypeus shallowly, squarely emarginate, lobes broad; mesonotum, scutellum, mesopleura punctured similarly to head; mesopectus more sparsely punctured; all tibial spurs simple; first joint of hind tarsi equal to $2+3+4$; claws rather minutely cleft; stigma broad at base, tapering to apex; transverse radial between apex on middle of the cell; transverse median between middle and base of cell; lanceolate cell contracted; abdomen minutely punctured. Colour black, subopaque; clypeus, labrum, spot on mandibles (rest piceous) white; posterior angles of pronotum, tegulae, small spot on scutellum, stripe on pleura, four anterior legs below apical third of coxae (the four anterior tarsi are somewhat reddish), basal plates, posterior trochanters, femora and tibiae, except at apex, line on outside of posterior coxae, yellow; apex of abdomen pallid; wings subhyaline, nervures and stigma brown.

Habitat.—Lincoln, Nebr., May. Type in the collection of the University of Nebraska.

This species is nearest *pulchella*, Klug, but may be known from it by the coxae being largely black and having the posterior femora entirely yellow.

Macrophya sambuci, n. sp.—♀. Length, 7 mm.; length of anterior wing, 7 mm. Short, robust. Head narrower than thorax, closely, coarsely punctured; ocelli in a rather low triangle; distance between the lateral ocelli much less than the distance to the nearest eye margin; third antennal joint longer than fourth; eyes converging, the distance between them at the clypeus about the same as the length of antennal joints $2+3$; clypeus with well-separated punctures, rather deeply, squarely emarginate, lobes broad, rounded at apex; mesonotum and scutellum finely, densely punctured, the sides of the lobes have the punctures larger; pleura with large, close punctures; mesopectus with fine, close punctures; inner spur

of anterior tibiæ bifid at apex ; first joint of hind tarsi equal to $2+3+4$; claws minutely cleft ; stigma slightly bulging from costa at base, widest in basal middle, from whence it tapers to apex ; venation normal ; abdomen finely punctured, sheath rounded at apex ; apex of abdomen with rather long hairs. Colour black ; head and thorax opaque, abdomen shining ; clypeus, labrum, spot on mandibles (rest piceous), white (in one specimen this white is strongly infuscated) ; broad angles of pronotum, tegulæ, spot on pleura, scutellum, basal plates, apex of four anterior coxæ, four anterior trochanters, four anterior legs below knees (the tarsi are infuscated), stripe on outer side of posterior coxæ, posterior trochanters, base of femora, posterior tibiæ except at apex, first joint of hind tarsi except at apex yellow ; wings yellow-hyaline ; costa, stigma and nervures brown.

Habitat.—Two ♀'s, Lincoln, Nebr., April 19, 1902, "on elder" (*Sambucus*), (W. D. Pierce); ♀, Nebraska (J. S. H.). Co-types in collection of Univ. of Nebr. and in author's collection.

This species is related to *pulchella*, Klug, but the coxæ are largely black. It is probably nearest to *zoe*, Kby., from which it may be known by having the anterior femora black all the way round, the middle tibiæ entirely pale, wing not darker at apex, etc.

Eriocampa rotundiformis, n. sp.—♂. Length, $5\frac{1}{2}$ mm.; length of anterior wing, $5\frac{1}{2}$ mm. Short, robust, head almost as wide as thorax ; occiput, vertex, cheeks sparsely punctured with large punctures, inner orbits densely punctured; ocelli in an equilateral triangle, distance between the lateral ocelli as great or a little more than the distance to nearest eye margin ; furrow on vertex strong, extending to ocelli ; ocellar basin large, well defined, walls sharp, pointed above and extending between lateral ocelli, wall coming to base of each antenna, open at the bottom ; second joint as long as first, but not as broad, third, joint as long as $4+5$; antennæ a little thicker in middle ; eyes very large, slightly converging below, distance between them at the clypeus about the same as the length of the third antennal joint ; clypeus rather densely punctured, circularly emarginate, lobes pointed ; mesonotum shining, and with very few punctures ; pronotum punctured with punctures about the size of those on the head ; scutellum with large punctures, closest anteriorly ; postscutellum densely punctured ; mesopleura with large, close punctures, larger than those on pronotum ; mesopectus shining, in middle with small punctures ; inner spur of anterior tibiæ bifid at apex ; tarsal claws deeply cleft, inner tooth shorter ; abdomen shining, parallel-sided. Colour black, apex of mandibles piceous ; ocelli hyaline ; anterior legs below coxæ, apex of

middle coxae, their trochanters, femora, except black band on apical half, tibiae and tarsi entirely, posterior trochanter, base of their femora, base of tibiae, and two basal joints of tarsi, white; wings hyaline, venation dark brown.

Habitat.—West Point, Nebr., June. Type in the collection of University of Nebraska.

Closely related to *Eriocampa rotunda*, Nort., but the four anterior femora have no black line above, and the middle femora are banded at apex; the third antennal joint is not curved.

Pachynematus nigrifibialis, n. sp.—♀. Length, 6½ mm.; length of anterior wing, 5½ mm. Head widened behind eyes, but not strongly so; frontal furrows distinct; ocellar basin indistinctly defined; frontal crest strong, rather pointed, slightly broken in the middle; two ridges meeting between the antennæ form the frontal crest; middle fovea distinct, oval in shape; antennæ longer than head and thorax, slender, tapering, third and fourth joints equal; antennal foveæ large, shallow; middle carina short, broad below, narrow above; clypeus shallowly, circularly emarginate, lobes small pointed; mesonotum and scutellum shining, with a few irregular punctures; inner claw tooth distinct, in about middle of claw; stigma broadest in middle, rounded on lower margin; in one specimen the second recurrent is interstitial with second transverse cubitus, in the others it is close to it, but not interstitial; venation otherwise normal; sheath rather broad, straight above, rounded below. Colour reddish-yellow; apex of mandibles piceous; antennæ, eyes, spot around ocelli, mesonotum, except sutures, scutellum, metanotum, broad stripe on abdomen above, spot beneath tegulae, mesopectus, posterior coxae, spot before them, posterior tibiae and tarsi, sheath, black; posterior femora at apex dark brown; wings hyaline, iridescent, nervures, costa and stigma dark brown.

Habitat.—Two ♀'s, West Point, Nebr., June; 1 ♀, Brownville, Nebr., June 5. Co-types in University of Nebraska and in author's collection.

In Marlatt's "Revision of Nematinae of N. Am." this runs to *auratus*, Marl., but is separated from that by the black mesonotum, black hind tibiae and tarsi, smaller size, not having the sheath so sharply pointed, etc. The head is not strongly developed behind eyes, and it might be said to go to *abdominalis*, Marl., but it is very different from that species, known at once by the different colour, different claw tooth, etc. The black hind tibiae and tarsi will serve to separate this species from its allies.

Pachynematus vernalis, n. sp.—♀. Length, 5 mm.; length of anterior wing, 5 mm. Robust, head nearly as wide as thorax, rather sparsely, finely punctured; enlarged behind eyes; ocellar furrows extending below ocelli, a middle furrow from lower ocellus; ocellar basin indistinct, frontal crest formed of a wavy ridge above antennæ, slightly broken in the middle; third, fourth and fifth antennal joints equal; antennæ slender, nearly as long as insect, covered with short hairs; middle fovea rather large, shallow, round; clypeus shallowly, circularly emarginate; mesonotum and scutellum rather finely punctured, inner claw tooth large, near apex (near the apex and longer on the anterior legs); second cubital cell small, subquadrate; second recurrent quite free from second transverse cubitus; stigma widest at base, gently tapering to apex; upper discal cell of hind wings slightly exceeding lower, much narrower than lower; sheath broad, rounded on lower margin, straight on upper; cerci short, stout. Colour reddish-brown; antennæ above at base, eyes, elongate spot on lateral lobes of mesonotum, posterior third of scutellum, spot on metanotum, black; wings hyaline, iridescent; nervures brown, costa and stigma yellowish.

Habitat.—One ♀ labelled as follows : " Saw-fly on Willow,
Oct. 5, '89.

Feb. 19, '90." Probably from Lincoln, Nebr., and raised from a larva on the Willow. Type in the University of Nebraska.

The size of the claw and its position makes the generic position of this species open to question. After examining it carefully with the compound microscope, I think it is a *Pachynematus*. In Marlatt's table, for *Pachynematus* it runs to *aurantiacus*, Marl., but is quite distinct from that species, being known by the slightly broken frontal crest, the shallowly emarginate clypeus, cerci short and stout, head without black, etc. It is not close to any *Pteronus*. In *Amauronematus* it is closely related to *brunneus*, Nort., and *Dyari*, Marl., but it is neither of these species.

Amauronematus xanthus, n. sp.—♀. Length, 7 mm.; length of anterior wing, $6\frac{3}{4}$ mm. Head densely, finely punctured, opaque; frontal furrows not clearly defined, not reaching occiput, but reaching antennal foveæ; ocellar basin well defined, walls rounded; frontal crest rather strong, slightly broken in the middle; middle fovea elongate, broader below; antennæ rather stout, joints three, four and five equal; clypeus rather deeply emarginate, lobes broad, more or less rounded; thorax above not as densely punctured as head; mesopleura and mesopectus not so

densely punctured as mesonotum, hence more shining; claws deeply cleft, teeth subequal; stigma rather broad, rounded on lower margin, widest near base; third cubital cell not strongly diverging, not much longer than the third transverse cubitus; upper discal cell exceeding lower on outer margin; sheath broad, rounded on upper and lower margins to an obtuse joint. Colour ferruginous; face below antennæ, clypeus, labrum, mandibles (apex piceous), posterior angles of pronotum, and tegulae, *pallid*; head back of the eyes, and part of legs, *fuscous*; antennæ, eyes and ocelli black (in one specimen the basal plates and part of metanotum are black); wings yellowish-hyaline, iridescent; nervures brown, costa and stigma yellowish, thorax, especially the pleura, with pale pubescence.

Habitat.—Lincoln, Nebr., two ♀'s, one in April. Co-types in University of Nebraska and in author's collection.

In structure this species is like *A. discolor*, Cress., but differs as follows: Antennal joints 3, 4 and 5 equal, intercostal nervure normal, stigma not acuminate, no black on mesonotum, etc. In colour it is much like *lineatus*, Harrg., but the frontal crest is broken, middle fovea not triangular, etc.

Amauronematus Lincolnensis, n. sp.—♀. Length about 6 mm.; length of anterior wing 6 mm. Head opaque, finely, densely punctured; ocelli in a rather lower triangle than usual; ocellar basin only faintly indicated; frontal crest strongly broken; middle fovea distinct, elongate; antennæ short, stout, third and fourth joints equal; clypeus deeply, narrowly emarginate, lobes broad, rounded; thorax not so densely punctured as head; mesopectus smooth, shining; claws deeply cleft, teeth subequal; first joint of hind tarsi equal to 2 and 3; stigma rounded on lower margin; broadest between middle and base; second r. n. not interstitial with second t. c., but near it; scutellum with a distinct middle, longitudinal furrow; postscutellum ridged in middle; sheath broad, rounded at apex, fringed with black hairs; cerci long, slender, not tapering. Colour rufo-ferruginous; apex of mandibles piceous; antennæ, eyes, ocelli, interocellar space, furrow of scutellum and apical margin, postscutellum, metanotum in middle, middle of basal plates, first five abdominal segments, except sides (the black narrows as it nears the apex), margin of sheath, *black*; head below antennæ, collar, tegulae, legs, *luteous*; wings yellowish hyaline, iridescent; nervures pale brown, costa and stigma yellowish or pallid; head and thorax with short white pile.

Habitat.—Lincoln, Nebr., May. Type in the Univ. of Nebraska.

In Marlatt's table (Nematinae of N. Am.) this species runs between *fulvipes*, Nort., and *pectoralis*, Cress., but is neither of these, as the clypeus is deeply, narrowly emarginate, the middle fovea elongate, etc.

Pristiphora zella, n. sp.—♀. Length, 6 mm.; length of anterior wing, $6\frac{1}{4}$ mm. Head punctured with medium-sized punctures, rather well separated, closest on inner orbits; frontal furrows not reaching occiput, but distinct just above the ocelli; distance between the lateral ocelli more than the distance to the nearest eye margin; sides of ocellar basin faintly seen below lateral ocelli; middle fovea deep, distinct, slightly elongate; third antennal joint longer than fourth, but only slightly so; antennal foveæ large; middle carina rather distinct, round on top; clypeus very slightly emarginate; mesonotum punctured, but not so strongly so as head; mesopleura and mesopectus shining, impunctate; first joint of hind tarsi longer than $2 + 3 + 4$; inner claw tooth large, in about middle of claw; stigma rounded on lower margin; transverse cubitals hyaline; sheath broad, apical margin with long hairs; cerci long. Colour black; anterior margins of clypeus, labrum, mandibles (apex piceous), broad lateral angles of pronotum, tegulae, legs entirely (femora reddish), sutures of metathorax at sides, between basal plates, venter, *pallid* or *white*; sheath brown; apex of posterior tibiae and their tarsi infuscated; ocelli (dry) hyaline; wings clear hyaline, iridescent; venation, except costa, which is pallid, brown; head and thorax with white pile, longest on clypeus; spot in second cubital cell small.

Habitat.—One ♀ from Nebraska, probably from Lincoln, May 5, '03. Type in collection of Univ. of Nebraska.

In Marlatt's table (Nematinae of N. Am.) this species runs to *Koebelei*, Marl. (Wash. and Alaska), but the abdomen above is entirely black, there is no rugous band before scutellum, and the structure of the head is different.

Euura perdita, n. sp.—♀. Length, $4\frac{1}{2}$ mm. Rather slender; head in the ocellar region with fine, rather dense punctures; ocelli forming a low triangle; ocellar basin wanting; middle fovea shallow, rather indistinct, circular; antennal foveæ not large; antennae medium, third, fourth and fifth joints equal; clypeus angularly emarginate, lobes broad, low, rounded at apex; dorsulum with some fine punctures; tarsal claws minutely cleft; intercostal nervure slightly basad to basal; transverse median in middle of cell; upper and lower discal cell of hind wing equal on outer margin; stigma straight on lower margin until about apical sixth,

where it joins the costa abruptly; sheath broad at base, tapering to an obtuse point. Colour black; posterior and upper orbits, face below antennæ, clypeus, labrum, mandibles, except tips which are piceous, palpi, posterior angles of pronotum, tegulae, legs entirely, apical segments of venter, reddish-yellow; flagellum beneath and entire apical joints rufous; posterior tarsi infuscated. Wings hyaline, nervures pale brown, costa and basal half of stigma pallid.

♂.—Length, $4\frac{1}{2}$ mm. More slender than ♀; differs from the ♀ as follows: ocellar basin present, but very shallow, bounded by low rounded walls; middle fovea shallower; stigma rounded on lower margin; lower discal cell of hind wing slightly exceeding lower; clypeus, labrum, mandibles, pallid. The mandibles are sharp, with a small inner tooth; procidentia rounded at apex.

Habitat.—♀, Delta, Colo., April 23, '97 (C. P. Gillette), "Willow galls"; ♂, Ft. Collins, Colo., March 30, '97 (E. G. Titus), "emerging from Willow galls collected in Jan.;" ♀, same as last; ♂, Delta, Colo., April 28, '97 (C. P. Gillette), "Willow galls, flies emerging May 23." The first ♀ and ♂ are the types. Type in the collection of the Colorado Agricultural College.

This species falls near *E. insularis*, Kincaid, and *E. salicicola*, E. A. Sm. It may be known from the former by the different shaped stigma, and from the latter by the more acutely pointed sheath. There are also other characters to separate it from these two species.

MOSQUITO COMMENT.

BY C. S. LUDLOW, PH. D.

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Reference to Dr. Dyar's recent article* is only necessary because his comment on *A. perplexens* mihi, may be construed to imply a carelessness in my work which does not exist. Naturally, Dr. Dyar could not know that the only times any interchange of lids has occurred have been when, at the National Museum, he, Dr. Knab and myself were discussing species, and it was impossible for me to keep track of all the lids; in these cases the mosquitoes were destroyed on my return to my rooms. Moreover, *A. perplexens* was found in a box with typical American mosquitoes which were undoubtedly taken at Gretna, Pa. My boxes are not uniform, nor is more than a small proportion of the collection even temporarily kept in

*Notes on Mosquito Work, CAN. ENT., Sept., 1908, page 312.
January, 1909

them. Dr. Dyar's suppositions as to the manner in which any error may have occurred are, therefore, entirely faulty, and he has apparently forgotten that I consulted him on this species, and he advised its publication.

I am myself, however, inclined to believe that a mistake may have been made in the habitat of this specimen, and that it probably is a Philippine mosquito; just as I feel quite sure that *Grahamia Spencerii*, Theob., owes its being reported from the Philippines to my very careful and interested Chinese servant, who, of course, would not realize that a dead mosquito picked up in the house and placed in one of the small boxes on my table could make dire confusion, so a similar interference by some uninformed but well-intentioned person may account for *A. perplexens*. At all events, if an error has been made it is not due to an interchange of box lids, and my own precautions are such that no transposition of the mosquitoes themselves could have taken place while in my hands.

In the February number of the CANADIAN ENTOMOLOGIST I described a new anophelina, and referred it to *Chagasia*. Comparison with the *Chagasia* in the British Museum leads me to believe it to be new, and I therefore make it the type of a new genus, *Calvertia*, named in honour of Dr. W. J. Calvert, of St. Louis, formerly of the Medical Corps, U. S. Army, at whose suggestion I began the study of Philippine mosquitoes.

CALVERTIA, nov. gen.

Head with forked scales, antennae bearing outstanding scales on the second joint and more appressed ones on the first; thorax with curved and broadly fusiform scales, not markedly outstanding laterally; abdomen with hairs, and on at least one segment bearing long flat more or less spatulate scales.

The genus lies near *Chagasia*.

There have lately been received from the Philippines two new mosquitoes described below.

Anopheles formosus, n. sp.—(Female.)

Head brown, with light yellow or white long slender curved scales on the vertex, and projecting forward in a tuft between the eyes, white forked scales on the occiput, and brown forked scales laterad and ventrad; antennæ dark brown, verticels and pubescence brown, basal joint testaceous; palpi brown, rather heavily scaled, the tip light, and bases of penultimate and antepenultimate joints narrowly light-banded, proboscis

dark brown, the labellæ slightly lighter; clypeus brown; eyes dark rich brown.

Thorax beautifully marked; prothoracic lobes dark brown, with dark brown long flat scales; mesonotum has the median part a light soft fawn colour covered with light yellow or whitish curved hair-like scales extending from the nape to the scutellum, except a small brown median spot just cephalad of the scutellum, and connecting with the dark median line; this median part is bordered with a more or less distinct white line, broadening toward the scutellum; there are also broad submedian yellowish stripes extending from the nape about half the length of the mesonotum; laterad the mesonotum is dark rich brown; scutellum light, continuing the colouring and scales of the medio-mesonotum; pleura rather grayish, with dark and white bands; metanotum rich yellowish brown.

Abdomen grayish brown, covered with long light yellow hairs.

Legs: coxae and trochanters light, with a little brown; the very bases of the femora light, otherwise the legs are a rich brown, with yellowish knee-spots and narrow yellowish bands at the bases of most of the tarsal joints, generally slightly including the apices of the preceding joint. These bands are on all the tarsal joints of the hind legs, and lacking on the fourth and fifth joints on the fore and mid legs; unguis simple and equal.

Wings yellowish, with brown spots; two small brown spots on the costa near the base, and two large ones, the proximal including the subcosta and first longitudinal practically as much as the costa, with a small extension on the root of the second long. vein, and a still smaller one just under the distal end of the large spot; the distal large spot begins just exterior to the junction of the subcosta with the costa, and ending a little interior to the junction of the first long. vein with the costa, and extends onto the first long. and upper fork of the secord long. vein, with small spots on the lower fork; the distal end of the lower fork of the second, of the third, of both forks of the fourth and of the fifth, have heavy dark spots; wing-field somewhat spotted; fringe is dark except at the junction of the first long. and costa, where it is yellow, and a pale spot midway between the forks of vein 5; cells long, the first submarginal as long as its stem, and a little longer and narrower than the second posterior cell; supernumerary and mid cross-veins meet, and are about equal in length, posterior cross-vein about as long as the mid, and more than its own length distant.

Halteres have light bases, with heavy dark knob.

Length, 10 mm. (proboscis 3.5 mm.).

Habitat : Camp John Hay, Benguet, P. I.

Taken March 20, 1908.

This large and beautifully marked *Anopheles* is the first of this genus to be received from the P. I., and shows the characteristic habitat of *Anopheles* in the tropics, coming from the high mountain regions of Benguet.

Pseudouranotenia parangensis, n. sp.—(Female).

Head brown, covered with flat scales, dark brown except a broad band of white scales around the eyes, meeting at the vertex, a few black bristles projecting forward; antennæ brown, verticels and pubescence brown, basal joint testaceous; palpi minute, brown; proboscis brown, apex swollen; clypeus brown; eyes brown.

Thorax: prothoracic lobes heavily clothed with white flat scales; mesonotum brown, partly denuded, but with brown curved scales scattered over it and more completely covering it laterally, a line of outstanding white or bluish-white scales extending from the wing joint cephalad about one-half the length of the mesonotum; scutellum brown, with brown flat scales; pleura dark brown, with a pronounced line of white flat scales; metanotum brown.

Abdomen brown, with dark brown scales and a white median spot extending over most of the dorsal aspect on the first, second, third and fourth segments, better developed on the third and fourth; venter light.

Legs: coxae and trochanters light; femora brown, ventrally lighter; tibiae brown, and on the fore and mid legs all the tarsal joints brown; on the hind legs the first and second tarsals are brown, the third, fourth and fifth pure white; unguis simple and equal.

Wings partly denuded, mostly brown-scaled, but half the length of the stem of the fifth, and the bases of the sixth with white roundish scales; fringe unspotted; the cells very short, the first submarginal a little shorter and somewhat narrower than second posterior cell; mid and supernumerary cross-veins of about equal length and meet, posterior cross-vein longer than mid and its own length distant posteriorly. Halteres with white stem and black knob.

Length, about 5 mm., of which the proboscis is nearly 2.5 mm.

Habitat : Parang Mindanao, P. I.

Taken : Collection undated, summer of 1908.

**COURTING AND MATING OF *OECANTHUS FASCIATUS*,
HARRIS.**

BY J. P. JENSEN, ENTOMOLOGICAL DEPARTMENT, CORNELL UNIVERSITY.

It was my good fortune to observe during the latter part of August, in Southern Minnesota, the courting and mating of *Oecanthus fasciatus*, one of the tree-crickets as yet without a common name, unless we call it the "Dark Whistler," a name proposed by Professor Comstock.

The insect under observation was doing his best, and I watched the wonderful, rapid motion of the wings that were elevated above the back at an angle of about 60 degrees, and making a blur to the eye so fast were they being rasped together. A female was soon seen hurrying up the



FIG. 1.—Courting habits of *Oecanthus fasciatus*.

stem, but still near the base. She stopped, twirled her antennae and walked a little higher, then ran out on a leaf and back again, plainly guided by the music. When within a foot of the male he detected her presence. The song changed, it was more broken. She ran out on another leaf searching for the male, and he bent out a little farther and apparently redoubled his efforts. The leaves were only a few inches apart, and she either saw or heard that he was still higher up, for she ran back to the stem, mounted to the leaf where the male was and ran out on it, but on the under side, placing herself longitudinally upon it. The male turned, placed himself in similar position and was quiet, the only motion noticed being the swaying and gently stroking together of the black

antennæ over the edge of the leaf. This continued for about five minutes, when the male sought the female on the under side of the leaf. This she apparently resented, and ran out a little farther. The male at intervals advanced towards her, elevating his tegmina and playing short, low notes.

The courting began at 4 p.m. and continued for twenty minutes, when they were both on the upper side of the leaf. At first the male approached the female head first, and when she retreated jumped back with a rapid jerk of the body. During the last ten minutes he made many attempts to slip the abdomen under the female, singing meanwhile the peculiar low notes, but her retreating prevented this. Finally the female did not retreat, and when another attempt was made mounted the back of the male, elevated her head in a curious attitude against a point about two-thirds from the base of his tegmina, and copulation followed, but lasted for a very short time, two or three seconds. The female then mounted his back farther and began to feed on the glands that are situated just back of the base of the hind wings. It seemed that she tired of this every few minutes, for she would run off a little way and the male would pursue her, singing, and, by pushing his abdomen under her, persuade her to continue. Sometimes the female would return of her own accord. This alternation of feeding or biting on the glands of the male continued for about thirty minutes, when I left them. When I returned they had disappeared. In other pairs I have seen it terminated by the female running away altogether. It very likely lasts for an hour or more, and possibly always follows copulation. What the nature of the glandular secretion is, if there is such, I do not know, and why the male so sedulously pursues the female to induce her to feed upon them is another puzzle. This feeding on the glands I have also noticed in *O. niveus*, and the performance was the same. In this insect it occurs at night, and may be observed by means of a lantern. After you become familiar with cricket notes you can generally tell whether pairing is going on, because the notes of the male are changed. This is true of the Nemobiids or Ground Crickets, the Gryllids or Field Crickets, and the Oecanthids or Tree Crickets. The nocturnal crickets, such as *O. niveus*, that pair and oviposit at night are curiously inattentive to artificial light, and will continue their operations with a bright acetylene lamp within a foot of them.

Blatchley asks this question with regard to the feeding of the female of *O. fasciatus* on the dorsal glands of the male: "Is it possible that in the mating of these Oecanthids the female removes the semen from the

glands, whose openings are beneath the tegmina of the male, and then fertilizes her ova?"

Dr. Howard, in his "Insect Book," says with reference to *O. niveus*: "Harrington has watched one of the concerts closely, and says, 'An interesting feature of its concerts is one of which I have not been able to find any mention in books accessible.' While the male is energetically shuffling together his wings raised almost vertically, the female may be seen standing just behind him, and, with her head applied to the base of the wings, evidently eager to get the full benefit of every note produced." The observer mentioned, no doubt, found the insects after pairing and while the female was feeding on the glands. When rather suddenly approached she will cease gnawing and sit perfectly still, while the male may continue singing until she begins again.

The tree-creickets in appearance, in graceful flight, in song and in general habits certainly are worthy of the place that they occupy systematically at the head of the Orthoptera. They are the aristocrats, the accomplished gentlefolk of the Order.

A NEWPORTIA IN UTAH.

BY RALPH V. CHAMBERLIN, PROVO, UTAH.

The Chilopod genus *Newportia* was erected in 1847 by Gervais for the species *Scolopocryptops longitarsis* of Newport, a form now known to occur in Cuba, St. Vincent, Central America, Colombia, Venezuela, and Brazil. Since that time some fifteen additional species belonging to the genus have been described, all of them from the region within the tropics of America, the general range of the genus corresponding roughly with that of the type species. It was, consequently, a matter of no little interest to find an individual representing a well-defined species of this genus as far north as Salt Lake City. Most of the species are thus far known from one or from but few individuals.

The genus *Newportia* belongs to the *Cryptopinæ*, the lowest of the three subfamilies of the *Scolopendridæ*. In common with the other genera of this subfamily eyes are absent in *Newportia*, and the tarsi of all the ambulatory legs, excepting the last two, consist each of but a single segment, the under surface of which bears a spine or a row of bristles. From the other genera of the *Cryptopinæ*, *Newportia* may be readily distinguished through the presence of twenty-three pairs of ambulatory legs,

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of which the last have become peculiarly specialized, having the tarsi slender or thread-like, and divided into a large number of short segments, being antenniform rather than like ordinary legs. Claws are normally absent from these last tarsi; but an individual has been found in which claws are present, this case probably representing an atavism to the more general *Cryptops*-like form from which specialization has proceeded in the group. In *Newportia* there are no teeth on the inner side of the femora of the prehensorial or poison feet. All the dorsal plates are marked with two impressed longitudinal lines or furrows, one each side of the middle, while on most of the plates there is outside of each of these an oblique furrow. The first dorsal plate is characteristically marked with a transverse furrow, which in most species is angularly bent backward at the middle. In some species the plate is distinctly depressed into a pit at this angle in the cervical line or furrow. In about half of the known species the two median furrows of the first dorsal plate bifurcate, the two inner of the diverging branches running inwardly and forward and meeting at the middle angle of the cervical line. A W-shaped mark is thus formed. (See Fig. 2.)

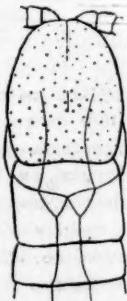


FIG. 2.—*Newportia Utahensis*: dorsal view of head and anterior segments.

The species of *Newportia* found in Utah is clearly most closely related to *Newportia azteca*, Humb. and Sauss. (*spinipes*, Poc.), the species ranging nearest it geographically. These two species differ from all the others with the W marking on the first dorsal plate, in having two spines at the distal end of the tibial joint of the legs, and in having at the same time a ventral spine below the apex of the tarsal joint. The Utah species differs from *azteca*, among other points, in the shape and proportions of the head plate and in the greater length and different disposition of its posterior furrows; in lacking dental plates, and in not having the anterior border of the presternum mesally deeply excavated; in having the last ventral plate more narrowed posteriorly, and its posterior margin but slightly incurved; in having the pseudo-pleura of the last segment covered with numerous spinules, both laterally and ventrally, among the pores, as well as along the posterior margins and over the basal portion of the posterior processes; and in the form and size of the spiracles.

Newportia Utahensis, new species.—Head longer than wide, its sides converging a little posteriorly and more strongly anteriorly from the middle; marked with a median longitudinal furrow extending from the anterior, slightly indented margin, posteriorly about one-fourth the length of the plate, and with a second short median furrow just back of the middle; the paired furrows on the posterior portion of plate beginning near the middle and first converging and then diverging to the posterior margin, evenly curving; finely punctate.

Antennæ with the usual seventeen articles, the first four of them sparsely clothed with relatively long bristles, the other articles subdensely clothed on their outer surfaces with short setæ.

Presternal plate punctate, its anterior margin on each side substraight, the margins of the two sides meeting in the middle at a slightly re-entrant angle; no median excavation.

First dorsal plate with the transverse or cervical furrow evenly curving, a little angulate at the middle; a depression or pit at the angle of the cervical furrow; the paired furrows bifurcating, the inner branches uniting at the angle in the cervical furrow, and forming thus the typical W-shaped impression.

The longitudinal furrows on the second dorsal plate conspicuously diverging from the anterior to the posterior margin.

The oblique, shallow lateral furrows are distinguishable from the third plate posteriorly.

The last dorsal plate with its posterior margin gently convexly rounded and slightly indented at the middle; without a median furrow.

Ventral plates finely and subdensely punctate; each with a distinct and scarcely abbreviated and distinct, fine submarginal furrows.

Last ventral plate with the sides sub-straight or a little convexly rounded; strongly narrowed posteriorly; the posterior margin but slightly incurved.

Basal segments of the ambulatory legs spinulose; the tibia armed at distal end with a conspicuous ventral spine, as well as with a second somewhat stouter spine dorsal or dorso-lateral in position; tarsal joint with a ventral spine below the distal end.

Pseudopleura of last segment with their posterior processes conical in shape, apically subobtuse; posterior margin above and laterally from the processes with a close row of short spines, which also cover the basal portion of the processes; similar short spines occurring over the entire

pseudopleura, both laterally and ventrally, among the numerous small pores.

Spiracles moderately small, mostly obliquely suboval.

The head and last five segments brown, a little paler beneath than above; elsewhere the body yellow, the anterior segments being darkened a little; legs pale yellow; antennæ light brown proximally, becoming yellow distally.

Length, 21 mm.

Locality: Warm Springs, Salt Lake County, Utah (May, 1908).

HEMIPTERA: NEW AND OLD.—NO. I.

BY G. W. KIRKALDY, HONOLULU, HAWAIIAN ISLANDS.

Fam. Aradidæ.

1. *Aradus montivagus*, nom. nov., = *planus*, Fabricius, 1803 (not of the same author, 1794).

Fam. Lygaeidæ.

2. *Acanthocephala nasula* (Say) = || *femorata* (Fabricius).
3. *Cletus signatus*, Walker, 1871, = || *bipunctata* (Westwood, 1842).
4. *C. bipunctatus*, H.-S., 1840, = *pugnator*, Lethierry & Severin, 1894, = *armatus*, Breddin, 1905.

C. pugnator was merely a misidentification of a Fabrician species, and was, moreover, unaccompanied by a description.

5. *Arenocoris*, Hahn, 1834, = *Pseudophloeus*, Burmeister, 1835, = *Spathocera*, Stein, 1860.

Pseudophloeus was proposed to supersede *Arenocoris* because the latter was, etymologically, a hybrid; it therefore must take the same type.

6. *Ulmicola*, nom. nov., = *Arenocoris*, Fieber, 1860, type *spinipes*.
7. *Coriscus Stalianus*, nom. nov., = || *Alydus dentipes*, Stal, 1868, Svensk. Vet. Handl., 7, No. 11, p. 65.
8. *Merocoris*, Perty, 1833 (not 1830).
Coriomeris, Westwood, 1842, = || *Merocoris*, Hahn, 1834 (not 1831).
[Fam. Cimicidæ: *Plisthenes*, = || *Merocoris*, Burmeister, 1834.]
9. *Riptortus nipponensis*, n. n., *II-clavatus*, Thunb., 1783, = *II-annulatus*, Uhler, 1860.
10. *Boudicca*, nom. nov., = *Pseudophloeus*, Auctt., type *Fallenii*.

Fam. Pyrrhocoridae.

11. *Pyrrhocoris*, Fallén, 1814, = *Astemma*, Lepeletier & Serville, 1825; type *apterus*. Lepeletier & Serville included three species in their genus at its inception, but the first, *apterus*, is the only one mentioned in the generic description, where it is cited as the only one whose habits are known.

Fam. Myodochidae.

12. *Oncopeltus Bergianus*, nom. nov., = || *Stalii*, Berg, 1883.
13. *Stalagmostethus sinensis* (as var. of *venustus*) (Reuter, 1888), = || *cruciger*, Motshulsky, = || *marginatus*, Jakovlev, = || *elegans*, Distant, = || *jakowleffi*, Lethierry & Severin.
14. *S. neotropicalis*, nom. nov., = || *dispar* (Stal).
15. *S. furcula* (H.-S., 1850), = || *festivus* (Thunberg).
16. *S. melanescicus*, nom. nov., = || *mactans* (Stal), = || *ruficeps* (Walker).
17. *Artheneis*, Spinola, 1837 (type *eymoides*), = *Nysius*, Dallas, 1852.
18. *A. helvetica* (H.-S., 1850), = *lineata* (Costa, 1852).
19. *Heterogaster semicolon*, Fieber, 1837, = *affinis*, H.-S., 1838.
20. *Oxycarenus pallens*, H.-S., 1850, = *collaris*, Mulsant & Rey, 1852.
21. *Tyrrheneis*, gen. nov., = *Artheneis*, Auct. (type *foveolata*).
22. *Orthea neotropicalis*, nom. nov., = || *serripes* (Fabricius).
23. *Rhyparochromus maculipennis*, Curtis, 1836, = *prætextatus*, H.-S., 1837.

Reuter has already pointed out that *Budaeus*, Distant, was founded on nymphs (mistaken for short-winged adults!). I think that *B. brevipennis*, Distant, is the final nymph of *Orthea pallicornis* (Dallas); the long fourth segment of the antennæ was evidently missing.

24. *Critobulus*, Distant, is also probably the nymph of a *Dieuches*.
25. *Ichnorhynchus truncatulus*, Walker, var. *Horvathiana*, nov., = || *geminatus*, Fieber.

Fam. Gerridae.

26. *Velia Osborniana*, nom. nov., = || *brunnea*, Osborn, 1904.

Fam. Reduviidae.

27. *Apiomerus incisus*, H.-S., 1846, = *geniculatus*, Erichson, 1848.
28. *A. rubricinctus*, var. *Stalianus*, nov., = || *geniculatus*, Stal.
29. *Coranus neotropicalis*, nom. nov., = || *bimaculatus* (Fabricius).
30. *Harpactor xosanus*, nom. nov., = || *tibialis*, Stal.
31. *Isocondylus pungens*, H.-S., 1846, = || *elongatus*, Lepeletier & Serville.
32. *Notocyrtus flavolineatus*, Stal, = || *dorsalis* (Gray).

33. *Patago patagonicus*, nom. nov., =|| *obsoletus* (Blanchard).
 34. *Phemius tuberculifer*, Stal, =|| *tibialis* (Westwood).
 35. *Pirates niger*, H.-S., 1835, = *unicolor*, H.-S., 1836, = *strepitans*, Rambur.
 36. *Ploegaster gesana*, nom. nov., =|| *geniculatus*, Lepeletier & Serville.
 37. *Reduvius osiris*, nom. nov., =|| *dorsalis*, Stal.
 38. *Spiniger Lepeletierianus*, nom. nov., =|| *ater* (Lepeletier & Serville).
 39. *S. circumcinctus*, nom. nov., =|| *limbatus* (Lepeletier & Serville).
 40. *Zelus speciosus*, var. *agavis*, Blasquez, 1870, = var. *Stollii*, Lethierry & Severin, 1896.

Fam. Miridæ.

41. *Calocoris neotropicalis*, nom. nov., =|| *bimaculatus* (Fabricius).
 42. *Liocoris tripustulatus*, var. *picta*, Hahn, 1833, = var. *autumnalis*, Reuter, 1875.
 43. *Reada Mayri*, White, 1878, = *Reuda Mayrii*, Atkinson Cat., 107.
 44. *Phytocoris helveticus*, nom. nov., =|| *albofasciatus*, Fieber.
 45. *Resthenia menanochra*, H.-S., 1846, = *melanochra*, Auctt.
 46. *Saturniomiris papuanus*, nom. nov., =|| *tristis* (Walker).
 47. *Tichorhinus pelagicus*, nom. nov., =|| *Orthotylus mutabilis*, F. B. White, 1878.

Fam. Issidæ.

48. In Bull. Haw. Plant. Ent., I, 440 (1906), I stated that the description of *Issus decipiens*, Spinola, was unknown to me. Melichar (1906, Abh. zool. bot. Ges., Wien, III, No. 4, p. 156) cites it as 1839, A. S. E., France, VIII, 3, but could not have referred to the original, as it certainly is not there. I suspect that the correct reference will be found in Gay's "Chile" (1852).
 49. *Hemisphaerius bipunctatus*, var. *rufomarginata*, nov., =|| *viridis*, Melichar.

Fam. Poekillopteridæ.

50. *Euricania jo* (Boisduval, 1835), = *oculata* (Guérin, 1838).
 51. *Mindura sundana*, nom. nov., =|| *fuscata*, Fabricius, 1794.
 52. *Ormenis antillarum*, nom. nov., =|| *quadripunctata* (Fabricius).
 53. *O. insulicola*, nom. nov., =|| *pygmaea* (Fabricius).
 54. *Neomelicharia amoena* (Walker), =|| *pustulata* (Donovan).

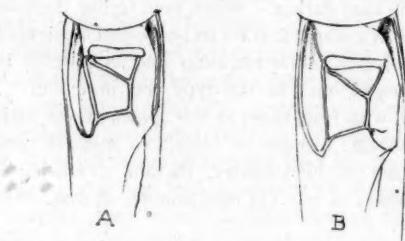
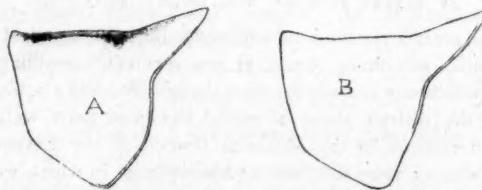
Fam. Tetrigoidæ.

55. *Stictodepsa neotropicalis*, nom. nov., =|| *fuscata* (Fabricius).
 56. *Euaeanthus interstinctus* (Fallén), =|| *acuminatus* (Fabricius).

A NEW ORCHELIUM FROM NEW JERSEY.

BY WM. T. DAVIS, NEW BRIGHTON, STATEN ISLAND, N. Y.

Early in September, 1908, I visited Dennisville, N. J., with Mr. Frank E. Watson and Mr. Wm. P. Comstock, making a general collection of insects. Among the captures were two male specimens of a highly-coloured species of *Orchelimum*. They were found on the tall grasses in a very wet swamp. Later in the month, while near Helmetta, N. J., an *Orchelimum* was heard singing a *zip, zip, zip—z, z, z,—zip, zip, zip—z, z, z,* quite a distinguishable song from that of *O. vulgare*. The songster was discovered to be the same highly-coloured species that we found at Dennisville. Near-by a female was found, and later other males. Mr. John A. Grossbeck has also taken this insect at Trenton, N. J.

FIG. 3.—A, *Orchelimum pulchellum*; B, *O. nigripes*: shrilling organs.FIG. 4.—A, *Orchelimum pulchellum*; B, *O. nigripes*: side view of thorax.

While this species resembles *Orchelimum nigripes*, Scudder, it is certainly distinct, being differently coloured, and having other characters, as may be seen from a series of both species. The name *Orchelimum pulchellum* is proposed for this beautifully-coloured insect. Mr. Louis

H. Joutel has kindly made for me some sketches of the shrilling organs and side-views of the thorax of both *nigripes* and *pulchellum*, whereby it will be seen that the right-hand nerve in *pulchellum* (A, Fig. 3) is straighter than the same nerve in *nigripes* (B, Fig. 3). A series further shows that the lower angles of the thorax are more rounded in *pulchellum* than in *nigripes* (A and B, Fig. 4).

In *pulchellum* the face is yellow, top of head and often along sides red, sometimes quite bright in colour. Thorax with the usual dorsal dark stripe, but darker than in *nigripes*. Sides bottle-green, under parts yellowish. Abdomen: dorsum dark, sides green, under surface a bright lemon-yellow, edged with brown. Legs: femora of first and second pair lemon-yellow on the inner surfaces, greenish on the outer; femora of hind pair lemon-yellow, with the apical half or third reddish. Tibiae of all of the legs reddish, the tarsi darker. When seen in life the insect is particularly beautiful, and is conspicuous for its bottle-green coloured tegmina, with a bluish tinge, its lemon-yellow markings and its reddish legs. The ovipositor is much curved, and in the type red in colour. The hind femora are each armed with from three to five spines on the under side.

Measurements.—Male: Length of body, 19 mm.; of pronotum, 5 mm.; of tegmina, 20 mm.; of hind femora, 16 mm. Female: Length of body, 20 mm.; of tegmina, 22 mm.; of hind femora, 18 mm.; of ovipositor, 9 mm.

TWO ADDITIONS TO THE LIST OF BUTTERFLIES OF THE ISLAND OF MONTREAL.*

BY ALBERT F. WINN, WESTMOUNT, P. Q.

One of the great attractions of collecting Butterflies and Moths lies in the probability of coming across, at any moment, something new to the locality in which one is working, even though common elsewhere.

Although the district about Montreal has been fairly well worked over since the formation of the Montreal Branch of the Entomological Society of Ontario, 35 years ago, not a season passes in which we do not find some moths, large or small, not previously observed and recorded. But finding a new butterfly is a different matter, and it was indeed a pleasant surprise when I came across a specimen of the little pepper-and-salt skipper, *Amblyscirtes samoset*, Scudder, flying over a very muddy field at

* Read at the Annual Meeting of the Entomological Society of Ontario, Nov. 6, 1908.

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Pt. aux Trembles, near the Rifle ranges, on June 7th, and a few minutes later I took another. My companion also wanted some, and a thorough search was made, resulting in Mr. Chagnon also capturing one in an adjoining field. The species is apparently commoner to the North among the Laurentian Mountains, where I have taken it at Montfort and St. Faustin, and also at Calumet, on the Ottawa River—always in early June.

A month later, July 12th, while walking across the Westmount Golf Links, with Mr. A. R. M. Boulton, of the Quebec Branch, a small yellow butterfly passed us, which looked like a very much undersized *Colias philodice*. My net was not ready, so my companion offered to catch it for me if I wanted it, but as the day was very warm I said not to chase it, as it would probably come back, but it kept straight on. We went the opposite way, to the Nun's Woods at Cote St. Luc, to look for *Haploa confusa*, Lyman, and were busy catching a series of these moths, when another of the little yellow butterflies came along. I was ready this time, and in a moment secured the first specimen of *Terias lisa*, Bd. and Lec. (The little Sulphur, Holland aptly calls it), that I had seen alive. Another soon appeared in the same place, and Mr. Boulton captured it. As we were close to a fine field of clover, we thought the butterflies were probably coming from it, and therefore turned our attention to it, but without seeing any more. We resumed our raid on the Haploas, going further into the woods, where *H. confusa* was scarcer, and *H. Lecontei* more likely to be found. We were again lucky, for in coming out of the woods on the west side into a small cedar swamp, another *Terias lisa* was flitting about, which I easily caught. As no more were visible, we adjourned to Cartersville for lunch.

TWO NEW BEES.

BY T. D. A. COCKERELL, BOULDER, COLO.

Nomada antonita, n. sp.

♂.—Length about 7 mm.; robust, the abdomen broadly oval; black, with cream-coloured markings; the thorax without red. Vertex and mesothorax very densely punctured; face very broad, with appressed silvery hair, not hiding the surface; the low and broad clypeus, very large triangular lateral marks (strongly indented opposite the antennæ), the base of the mandibles and a narrow stripe along the posterior orbital margin (except

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the upper fifth) all cream-coloured; *no supraclypeal mark*; mandibles simple; labrum with the upper third cream-colour, the rest ferruginous; lateral marks ending about the upper level of the antennal sockets, but there is a short reddish-yellow stripe higher up near the eye, and a minute dot at the summit; *scape bright ferruginous, not much swollen*; flagellum stout, dark fuscous above and bright ferruginous beneath; *third antennal joint conspicuously longer than fourth*. Mesothorax and metathorax entirely black, the base of the latter dull and granular; upper margin of prothorax, tubercles, tegulae, large irregular mark on pleura, scutellum and postscutellum, all cream-colour; wings clear, stigma ferruginous, nervures fuscous; first r. n. reaching second s. m. beyond middle; b. n. meeting t. c.; legs ferruginous, with the knees, anterior and middle tibiae in front, hind tibiae in front at base and apex, and large area on hind coxae, all cream-colour; *anterior coxae without spines*. Abdomen very minutely but strongly and closely punctured; first segment black, with a broad ferruginous band, at each side of which is a small yellow patch; segments 2 to 6 each with a very broad creamy-white band, occupying most of the surface, but much constricted in the middle on second; hind margins and extreme bases of these segments black; *apical plate broad, truncate with rounded corners, quite entire*; ventral segments, except the first, almost entirely creamy-white.

Hab.—Antonito, Colorado, Aug. 5, 1900; from the Colorado Agricultural College.

In my tables of Rocky Mountain *Nomada* this species runs out at 36. In appearance, however, it suggests the subgenus *Micronomada*, from which it differs by the spineless anterior coxae. It is a very pretty and distinct little species.

Bombus hyperboreus Albertensis, n. var. (vel. n. sp.?).

♀.—Length about 19 mm.; width of abdomen 8; ocelli small, as in *Bombus*, s. str.; clypeus shining, convex, with sparse punctures of unequal sizes, some very faint; malar space about one-fourth broader than long; upper outer face of mandibles with three strong ridges; labrum with a pair of widely-separated transversely oval bosses; flagellum short, third antennal joint about as long as 4 + 5; mesothorax densely punctured, except in middle, where it is smooth and shining; hair of head black, of thorax in front, pleura and scutellum, tawny-yellow, but a very broad black band between the wings; wings strongly reddened, a dark cloud at apex

of marginal cell; abdomen rather narrow, with coarse black hair, except on first segment and anterior middle (tapering laterally) of second, where it is tawny-yellow; hair of legs black, spinules on tarsi ferruginous.

Hab.—Calgary, Alberta, British America (*F. H. Wolley Dod*).

The coloration of the abdomen is as in *B. separatus*, which, however, is a *Bombias*. The insect is probably a race of *B. hyperboreus grænlandicus*, (Smith), but it has the yellow on the abdomen reduced. It is also related to *B. pleuralis*, Nyl., which Friese makes a subspecies of *B. Kirbyellus*, Curtis.

A REMARK ON THE IGNOTUS ÆNIGMATICUS.

BY PHILIPP ZAITZEV, ST. PETERSBURG, RUSSIA.

With special interest I read in the pages of this journal, 1908, No. 7, a paper by Mrs. A. T. Slosson, "A Bit of Contemporary History," treating of the habits of one of the most peculiar and interesting representatives of Coleoptera. Nearly all the past year this minute creature attracted my attention, being an uninvited guest at my home. Some of my observations and considerations about this subject I hope to expose on the pages of *Revue Russe d'Entomologie* in the next issue; at present I will confine myself to the remark that this mysterious stranger of my esteemed entomological colleague is, properly speaking, a very old friend of ours, described and figured in 1839 by V. Motschulsky (*Bull. Soc. Nat. Moscou* xii., page 76, t. v.; f. 1-6), from Transcaucasia, under the name of *Thelydrias contractus*. Afterwards this species (without doubt identical will *Ignotus ænigmaticus!*) was described by Reitter from specimens from the Transcaspian Province and Turkestan, and placed by him, very unfortunately, in the group of *Driloris* (family *Cantharodidæ*). Bestimm; *Tabelle d'Europ. Coleopt.*, XXIX., 1894.

TO WHOM IT MAY CONCERN:

Subscribers to the CANADIAN ENTOMOLOGIST are reminded that the fee for 1909 is now due, and should be paid to the Treasurer of the Entomological Society, Guelph, Ontario, forthwith. Remittances may be sent by post-office or express money order, but personal cheques on local banks are not acceptable, as it costs from 10 to 25 cents to get them cashed. As a rule, the magazine is sent until ordered to be discontinued, so that regular subscribers may not suffer any inconvenience.

NOTES ON THE FORMS OF *RUSTICUS ACMON* (DB.-HEW.),
SCUDDER, OCCURRING IN THE VICINITY OF
PASADENA, CALIF.

BY VICTOR L. CLEMENCE, PASADENA, CALIF.

For some time the writer has made a special study of the different forms of *Rusticus acmon*. This special work has resulted in the possession of large series of four distinct forms.

From Boisduval's description of *R. antægon* (which he admits is the same as *R. acmon*), and by comparison with Doubl.-Hew., Plate 76, fig. 2, also with specimens from Boisduval's type locality, "les environs de San Francisco," I have decided which of these forms is typical. I may also add that Strecker's description in "Lepidoptera: Rhopaloceres and Heteroceres, indigenous and exotic," also describes this form.

Careful observations made during the last two seasons show that of the other three forms two are seasonal, while the other is a new subspecies occurring only in the mountains at an altitude of not less than 3,000 feet, and frequenting only *Eriogonum fasciculatum*, which is probably its food-plant, while that of the other forms is *Hosackia glabra*, generally admitted to be the food-plant of true *acmon* or *antægon*.

The new subspecies, which I have named *Rusticus monticola*, is a much finer butterfly than *acmon*, being larger and more brilliantly coloured. Of the remaining two forms, one occurs from February to April, is small in size, of a darker blue than the type form, and heavily margined in black, which leads me to think that the imagoes are produced from pupæ which have hibernated. The remaining form appears about May the 9th, is larger than the preceding, resembling the type form, only is larger, and has not such a pronounced violet tinge.

The writer realizes the value and necessity of applying the test of breeding in order to correctly classify these different forms, but owing to daily observations and also the valuable help which he has received from Mr. Fordyce Grinnell, Jr., feels assured that his deductions would be fully justified by the above-mentioned test. From the length of time that *acmon* is on the wing, from February till October, it may safely be assumed that there are at least three broods; therefore, these different forms are probably seasonal, as previously stated.

Rusticus monticola, n. subsp.—The type, 2 ♂♂'s, 2 ♀♀'s, are taken from a series of 21 insects in the author's collection.

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Male.—Expands 28-31 mm. Upper side of primaries bright silvery-blue, with heavy black marginal border. No discal spot. Secondaries bright silvery-blue, with very narrow black marginal border. There is a row of five black dots separated from ground colour by heavy red crescents extending along the marginal border. The general colour of under side is ash gray, flushed with bluish scales. The markings are the same as *acmon*, only much heavier and more distinct. All wings fringed with white.

Female.—Expanse 30-35 mm. Upper side of primaries bright blue, with black discal bar. The outer half of wing is taken up with a broad black band, which fades into ground colour towards base. Secondaries same as male, only red crescents are twice as wide, occupying nearly one-third of the wing. Ground colour of under side brownish-gray, markings very heavy and pronounced, as with the male.

The females appear to vary considerably. Some have the red crescents continued on primaries. Another specimen in my series has a marginal row of white spots on primaries. I have never come across these variations among true *acmon*, though I have examined hundreds of specimens from different localities.

A comparative table of *R. acmon* and *R. monticola* reads as follows:

MALE.

R. acmon.

Expanse, 25-27 mm.
Ground colour *violet-blue*.
Marginal band primaries *narrow*.
Red crescents on sec. *indistinct*.

Markings on under side *distinct*.

R. monticola.

Expanse, 28-31 mm.
Ground colour *silvery-blue*.
Marginal band primaries *broad*.
Red crescents on sec. *very pronounced*.

Markings on under side *very heavy*.

FEMALE.

Expanse, 21-26 mm.
Ground colour *dark brown*.

Expanse, 30-35 mm.
Ground colour *silvery-blue*.

Other differences same as in the male.

THE ANNUAL REPORT of the Society to the Legislature of Ontario is now in the printers' hands, and will probably be ready in March. It is distributed by the Department of Agriculture at Toronto, and will only be sent to those whose subscription for 1909 has been duly paid.

BOOK NOTICE.

MANUAL OF NORTH AMERICAN DIPTERA, by Samuel W. Williston.
Third edition, illustrated; 405 pages.—James T. Hathaway, 297
Crown Street, New Haven, Conn. (Price \$4.00, postpaid.)

During the last twelve years the earlier edition of this work has been found most useful by professional Entomologists, whether engaged in teaching or in economic work, and has served as a daily handbook for the few students of the order. To all of these it must be a source of much gratification that the author has been enabled to complete this comprehensive and excellent manual, which will be no small help to them in their work. The assistance that it will render to all who attempt to study the Diptera of North America is so great that it should lead many to devote themselves to the investigation of the much neglected but highly important Two-winged Flies.

The present edition contains definitions of about twelve hundred genera, being all that are known from North and Central America and the West Indies, with the exception of a few doubtful forms; more than half of these genera are more fully defined by means of nearly a thousand photographs and carefully drawn figures, which are an immense help in the determination of forms. Of sixty-one families synoptic tables are given, preceded by a table of the families themselves. By means of these and the explanatory figures, a student should be able, after a little practice, to "run down" to its genus any fair-sized fly, and after gaining experience in this way to enter upon a careful scientific study of any family to which his attention may particularly be drawn. The Introduction deserves to be read by all Entomologists, who will find the observations and advice contained in it of great interest and much value. This is followed by a series of chapters on the structure of the various parts of the insects, the head and its organs, the thorax, legs, wings, etc., and the vestiture, which is of so much importance in the differentiation of many forms.

The author has been assisted in his work by all the well-known North American Dipterists, few in number though they be, and he and they are to be congratulated upon the completion of a work which should give an immense impetus to the study of this difficult order. A copy of the book should certainly be in every scientific library, and no professional Entomologist can afford to be without it.

Mailed January 7th, 1909.

